IN THE SPECIFICATION:

Please replace paragraph number **[0007]** with the following rewritten paragraph:

[0007] A board-on-chip (BOC) semiconductor package has also been developed, in which an interposer substrate such as a relatively small, slightly larger than die-size interposer substrate is formed with a centrally placed, elongate through-slot sized and configured for alignment with a row or rows of bond pads on the die. The through-slot is also known as an “interconnect slot” or “wire bond ~~slot”.~~ slot.” The die is adhesively joined by its active surface to one side of the interposer substrate such that the bond pads are accessible through the interconnect slot. The bond pads are connected to conductive traces on the opposite side of the interposer substrate, by bond wires, for example, which pass through the interconnect slot. The interconnect slot is then filled with a filled polymer encapsulant to encase and seal the bond wires and surrounding, exposed portion of the die’s active surface. Conventionally, a transfer molding process is used to form this wire bond mold cap while simultaneously encapsulating the backside and sides of the die on the opposite side of the interposer substrate. A ball grid array (BGA) or other type of array of discrete conductive elements electrically connected to the conductive traces and projecting from the side of the interposer substrate with the wire bond cap may be used to mechanically and electrically connect the package to a carrier substrate or other higher-level packaging. Various examples of this type of package construction are shown in U.S. Patent Nos. 5,723,907 and 5,739,585 to Akram and 5,818,698 to Corisis, all of which patents are assigned to the assignee of the present application and the disclosure of each of which is incorporated by reference herein. The resulting package has a much reduced size, which may be termed “chip scale” or “near chip scale,” and is generally capable of establishing robust, high-quality mechanical and electrical connections using conventional bonding techniques.

Please replace paragraph number **[0010]** with the following rewritten paragraph:

[0010] The aforementioned stress cracking in conventional BOC-type packages has been found to be largely concentrated at the interface between the interconnect slot edge and the mold cap itself. It has been recognized that the magnitude and frequency of occurrence of this problem is greater where the length of the elongated, central interconnect slot is a major portion

of the corresponding substrate length. In BOC-type packages having an interposer substrate with an interconnect slot, the interconnect slot length is typically about 70 to ~~80 %~~ 80% of the corresponding substrate length. It has been estimated that an unacceptably high failure rate generally occurs where the slot length is about ~~67 %or~~ 67% or more of the substrate length (for a bismaleimide triazine (BT) resin substrate). Thus, the problem may be very pervasive, as such relative slot lengths are quite common and necessary to accommodate the large number of bond pads required for operation of state of the art dice. Where the interposer substrate comprises another material, such as a ceramic for example, the critical ratio of slot length to substrate length may be somewhat different.

Please replace paragraph number **[0018]** with the following rewritten paragraph:

[0018] FIG. 3 is a schematic graphical view of tensile bending stresses exerted ~~a~~ on a BOC semiconductor package such as the prior art semiconductor package of FIG. 1 as a function of lateral distance from the centerline thereof;

Please replace paragraph number **[0023]** with the following rewritten paragraph:

[0023] FIG. 7 is a ~~side~~ side-sectional view of yet another embodiment of a reinforced interposer substrate in accordance with the present invention;

Please replace paragraph number **[0031]** with the following rewritten paragraph:

[0031] FIG. 1 also illustrates bending stresses 72 which occur when the package 10 is subjected to temperature cycling and thermal shock. The interposer substrate 20 is thus cycled back and forth between compressive and tensile stress conditions. When in a tensile state, the stresses act on the wire bond mold cap 56 and the edges 46 of the interconnect slot 40, tending to separate them. Cracks 58 propagate at the interface 74 between the mold cap 56 and edges 46, or within the mold cap 56 itself, to relieve the applied tensile stress. Breakage of bond wires 38 lying in the path of a crack may also occur. As depicted in the generalized graph of FIG. 3, the stress values 61 (whether tensile or compressive) increase as shown at 62 toward the center of interposer substrate 20 and attain peak values 64 generally along the centerline 42 of the

interposer substrate 20. Conversely, stress levels decrease with distance 66 from the centerline 42 of interposer substrate 20. Of course, it is the occurrence of peak ~~tensile stress~~ values 64, for stress which causes the aforementioned damage in the interconnect slot region.

Please replace paragraph number **[0032]** with the following rewritten paragraph:

[0032] FIG. 2 depicts the exemplary interposer substrate 20 of FIG. 1. Interposer substrate 20 is shown in this embodiment as a planar member with a surface 22 and an opposed surface 24. The interposer substrate 20 has a length 52. A die (not shown in FIG. 2) with a central row of bond pads will be attached to die attachment area 18 on the surface 22 such that the bond pads will be exposed through the interconnect slot 40. Conductive traces 30 (not shown in FIG. 2) are formed on the surface 24, as already discussed. As shown, the interconnect slot 40 has a length 48 which, in many instances, is about ~~70-80 %~~ 70-80% of the substrate length 52 so as to extend a length at least slightly greater than the row or rows of centrally placed bond pads 34 of the die 12 with which interposer substrate 20 is assembled. The slot width 50 is typically made as narrow as possible because of the required space for conductive traces 30 on the outer surface 24 but is required to be of sufficient width to accommodate a wire bond capillary used to place bond wires 38 and form bonds with bond pads 34 and the ends of conductive traces 30 adjacent interconnect slot 40. Also shown are vertical axis 28 oriented perpendicular to the plane of interposer substrate 20 through the interconnect slot 40 and longitudinal axis or centerline 42 extending through the interconnect slot 40 in the plane of interposer substrate 20. The interconnect slot ends 44 are typically rounded or filleted, a natural consequence of slot formation in the interposer substrate 20 by milling. Slot ends 44 rounded as shown have higher strength than, e.g., squared ends, corners of which are subject to crack initiation and propagation.

Please replace paragraph number **[0033]** with the following rewritten paragraph:

[0033] In the present invention, one or more crosspieces or bridges 70 (FIG. 4) are formed between the slot ends 44 of the elongate interconnect slot 40. These crosspieces or bridges provide a multisegmented interconnect slot 40 and reinforce the interposer substrate 20

between the opposing edges 46 of the interconnect slot 40 at intermediate locations along the interconnect slot 40 against bending attributable to stresses applied thereto. Turning now to FIG. 4, one exemplary embodiment of the interposer substrate 20 of the invention is shown, together with a die 12 with a single central row 36 of bond pads 34. A crosspiece or bridge 70 comprises a filleted portion of the interposer substrate 20 which is left uncut during manufacture, i.e., two longitudinally adjacent interconnect slots or slot segments 40A, 40B are formed in interposer substrate 20 instead of a single interconnect slot, leaving crosspiece or bridge 70 in place. The interconnect slot segments 40A, 40B of the invention are shown with a combined length (48A + 48B) which is slightly less than the length 48 of a single prior art interconnect slot 40 for a similarly sized interposer substrate. However, the longitudinal distal end-to-distal end length of the two interconnect slot segments 40A, 40B may be equivalent to, or even longer than, that of a single prior art interconnect slot 40. The width 76 of the crosspiece or bridge 70 in the direction of centerline 42 is small, generally about 0.5 mm or more for a BT resin interposer substrate given manufacturing tolerances, but sufficient to extend between longitudinally adjacent bond pads 34. It may be desirable to space bond pads 34 into two or more longitudinally adjacent groups with increased pitch between groups to enable the use of larger-width crosspieces or bridges 70, as depicted in FIG. 9. If necessary, more than one crosspiece 70 may be used, generally evenly spaced along the interconnect slot 40 (see slot segments 40A, 40B and 40C in FIG. 9A), to divide the interconnect slot 40 into three or even more segments to provide a required resistance to bending. Generally, however, for bond pad row lengths 84 for dice of about 3 to 15 mm in length, a single, substantially centrally placed crosspiece or bridge 70 is sufficient to avoid stress cracking or delamination of the wire bond mold cap 56. For longer dice, two or more longitudinally spaced crosspieces or bridges 70 may be desirable to avoid stress cracking or delamination of the wire bond mold cap 56.

Please replace paragraph number **[0035]** with the following rewritten paragraph:

[0035] FIG. 5 illustrates another embodiment of a crosspiece or bridge 70. In this version, the crosspiece or bridge 70 comprises a narrow segment of material which is adhered by its ~~underside at~~ underside 86 to surface 24 of interposer substrate 20 with a high-strength adhesive. This crosspiece or bridge 70 may be formed of a high-strength material with a

coefficient of thermal expansion (CTE) approximating the CTE of the interposer substrate 20. For example, a reinforced polymer (such as a glass-reinforced polymer) may be used to form a thin tape having a minimum width 76 of about 0.5 mm. Other reinforced materials such as a polyimide tape, a ceramic element or a silicon-type element may be used.

Please replace paragraph number **[0036]** with the following rewritten paragraph:

[0036] It is also contemplated, as illustrated in FIG. 5A, that a laterally elongated "I"-shaped segment 70A bearing adhesive on both ~~side~~ sides thereof and used for mounting a die 12 to interposer substrate 20 may be formed such as by die-cutting from a larger sheet and placed on surface 22 of interposer substrate 20 with the head 70H and foot 70F of the segment lying on opposing sides of an interconnect slot 40 and the body 70B of the "I" forming the reinforcing crosspiece or bridge 70 thereacross. Of course, segment 70A may also be formed with two or more crosspieces to extend at intervals across interconnect slot 40, or two or more "I"-shaped segments 70A employed. Segment 70A may comprise, for example, a tape segment or a relatively stiff plastic segment.

Please replace paragraph number **[0038]** with the following rewritten paragraph:

[0038] FIG. 7 depicts yet another embodiment of the present invention, in which a ~~"T"-shaped~~ "T"-shaped crosspiece or bridge 70T is placed with its body 70B snugly placed in interconnect slot 40 and the legs of cap 70C extending over surface 22 transversely to centerline 42, both body 70B and cap 70C being adhesively bonded to interposer substrate 20.

Please replace paragraph number **[0039]** with the following rewritten paragraph:

[0039] As noted above, for dice 12 which may normally have an interpad spacing or pitch 8 (see FIG. 4) less than about 0.5 mm, the die design to accommodate any of the foregoing embodiments of the present invention may require a slightly larger bond pad spacing at one or several locations along the row 36 of bond pads 34. Thus, for example, a die 12 may be formed with a pad spacing of 0.4 mm along ~~95 percent~~ 95% of the row of bond pads, while the spacing between two adjacent centrally located bond pads is increased to 0.6 mm. Thus, a crosspiece or

bridge 70 may be accommodated without significantly changing the overall length 84 of the row 36 of bond pads 34. Such an arrangement of bond pads 34 on a die 12 in the form of three groups of bond pads 34, each group comprising two parallel rows flanking the centerline of the die 12, is illustrated in FIG. 9. However, in the embodiments of FIGS. 5, 5A, 6 and 7, it should be noted that use of a crosspiece or bridge of a higher strength against bending than the material of interposer substrate 20 may enable the use of a thinner crosspiece or bridge 70 which may accommodate existing bond pad spacing or pitch. Similarly, if an appropriate material is selected for interposer substrate 20 and tight manufacturing tolerances may be held, a thin but effective crosspiece or bridge 70 may provide adequate resistance to bending stresses while accommodating existing bond pad spacing or pitch.

Please replace paragraph number **[0041]** with the following rewritten paragraph:

[0041] In the discussion thus far, it is noted that the dice 12 are disposed on a planar surface 22 of the <u>interposer</u> substrate 20. However, the invention is applicable to packages in which the interposer substrate 20 or a base including the interposer substrate has a die-receiving cavity and/or a conductor-carrying cavity on a surface 22 or 24 thereof.